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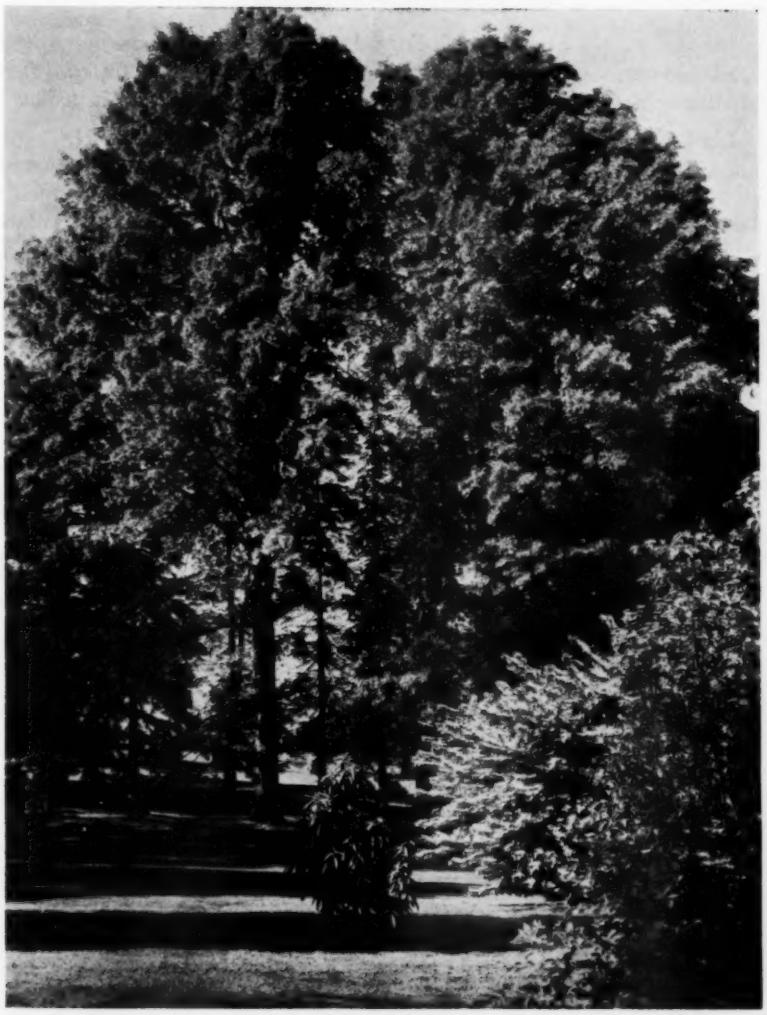

Pin Oaks at the Arboretum

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THE MORRIS ARBORETUM

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THE ASSOCIATES, through whose interest and generosity *The Bulletin* and certain other undertakings of the Arboretum are made possible, is an informal group of individuals interested in encouraging and furthering the educational and research endeavors of the Morris Arboretum. Further information concerning this organizationwill be sent on request.

ARBORETUM ACTIVITIES

The major project for the fall planting season has been an enlargement of the main Rhododendron collection along Germantown Avenue. Even at the Arboretum where care is given to provide sufficient space for plants to develop, it is found that thinning often becomes necessary after five or ten years. To accommodate the Rhododendrons that have to be moved, and those now ready to leave the nurseries, an extension of the large bed has been prepared over the past year.

First a large Norway Maple growing in the area of extension was cut down and the stump poisoned. The foliage was too dense and the surface roots too voracious to justify leaving it. The soil was then enriched to a depth of two feet with leaf mold, German peat moss, Michigan peat, and a small amount of manure. After a year of settling, the bed was ready for planting this autumn.

To provide variety of texture and ultimate shade, four Canadian Hemlocks were then planted. These will serve as a background for the Rhododendrons moved in from the old section as well as for two new groups. One of the newly established groups is a collection of unusual Rhododendron species grown from seed obtained from the Royal Botanic Gardens in Edinburgh. These will ultimately range in size from one foot *(R. pemokoense)* to twenty-five feet *(R. vernicosum)*, their variation in flower size and color being equally great. One species in particular, *R. dicroanthum*, has shown great promise in the nursery. It boasts a low, mounded habit, exceptionally clean neat foliage, and lovely salmon-red flowers, reminiscent of some of Mr. Charles Dexter's hybrids.

The other new group consists of the first selections of Dr. Henry Skinner's broad-leaved Rhododendron crosses, made in the late 1940's. The parents were carefully chosen, many being *Fortunei* hybrids, and we hope that the progeny will profit from such "aristocratic blood."

M. H. S.

Notes on the Geology and Ecology of the Morris Arboretum

Edgar T. Wherry

The 175-acre tract comprised in the Morris Arboretum is underlain by varied geological formations, and furnishes a number of habitats for growing plants of differing ecological relationships. On the accompanying map (Fig. 21.) the areas occupied by the three principal rock types are shown.

In the southern strip, marked by a pattern of dots, the underlying formation is Baltimore gneiss. This is a crystalline rock with light and dark minerals in alternating layers, yielding a banded appearance. The chief light minerals are feldspar and quartz, the dark ones micas and amphiboles. Locally these minerals have been so metamorphosed that the rock has changed to a mylonite, with blebs and streaks of feldspar in a dull gray ground-mass so fine-grained that the individual mineral constituents cannot be distinguished.

Under the influence of weathering agencies the Baltimore gneiss gives rise to a buff-colored clayey soil—known technically as the Chester loam. Owing to abundance of feldspar and mica, this soil is fairly high in potassium, but as phosphorus-bearing minerals are small in amount, it is rather low in that element. In reaction it tends to become moderately acid, although not sufficiently so to inhibit seriously the activities of nitrogen-fixing micro-organisms, and so contains adequate amounts of this, the third major nutrient element. The minor elements, calcium, magnesium, and iron, are present in several of the rock-minerals.

The medial ridge, on which the Morris residence stands, is underlain by a stratified rock of Lower Cambrian age, termed in reference to its striking development in a cliff on the Susquehanna River, the Chickies quartzite. This was originally deposited as sandy strata in a shallow inland sea extending northeastward from the Gulf of Mexico region during early Cambrian time. These sand beds were subsequently buried under vast thicknesses of other formations, and circulating waters deposited silica in the interspaces between the grains, forming a hard, impervious rock. Clay originally mingled with the sand grains was metamorphosed to fine-grained mica, and iron compounds to massive-crystalline hematite.

Ultimately the Appalachian revolution took place, uplifting and folding the originally horizon-

Fig. 20. Quartzite cliff along the Wissahickon Creek.

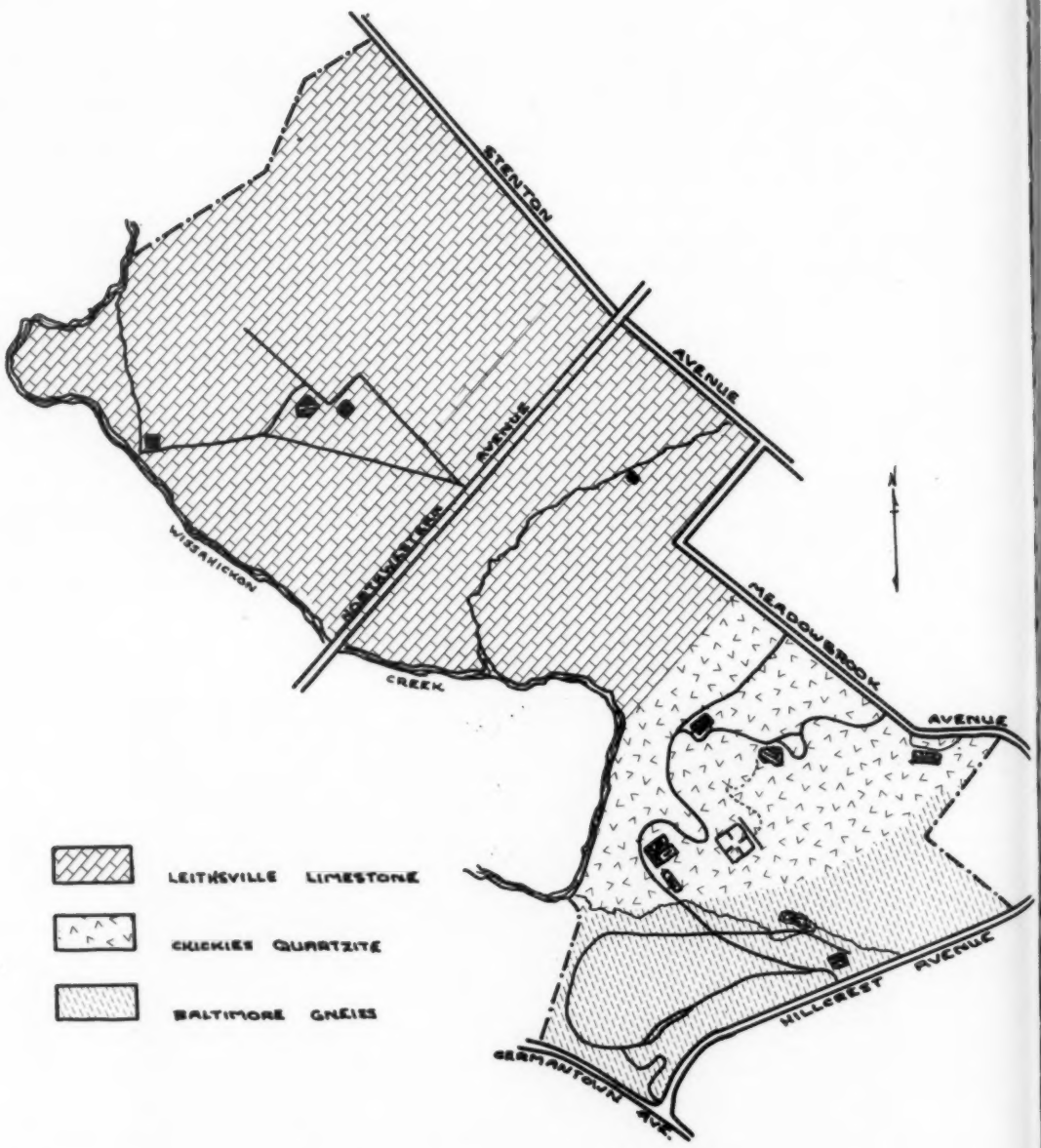

Fig. 21. Geological formations at the Arboretum.

MAP PREPARED BY MARTHA H. STARR

tal strata. In our area the Chickies quartzite beds were uplifted to a vertical position, as can be seen in the cliff jutting out into the Wissahickon Creek. (Fig. 20.)* Subsequent erosion has removed vast amounts of these and other strata, but so resistant is the quartzite that it forms the dominating ridge of the Arboretum tract.

Chickies quartzite weathers gradually to a yellowish gray soil containing numerous silica chips, known technically as the DeKalb sandy loam. From the standpoint of plant nutrition this is a relatively poor, sterile soil. The mica yields a fair amount of potassium, but phosphorus minerals are so sparsely present in the rock that there is a marked deficiency of this element. Minerals containing readily available bases being also lacking, in the course of weathering and soil development a relatively high degree of acidity builds up. This tends to suppress the growth of nitrogen-fixing micro-organisms, and the De Kalb soil is correspondingly low in nitrogen content.

The northern portion of the Arboretum tract is underlain by a third geological formation: magnesian limestone termed from its prominence near a village in eastern Pennsylvania the Leithsville formation. This too is of Lower Cambrian age, and was deposited in the same inland sea as the Chickies, but under different conditions. Instead of sand, the streams now brought into the sea suspensions of mud, and dissolved calcium compounds. Large quantities of calcium together with some magnesium precipitated out of the sea water, forming strata which in time hardened up into limestone. The Appalachian revolution uplifted and folded these beds, raising them far above sea level, and exposing them to erosion. Being relatively soluble, the upper portions were soon removed, and the Whitemarsh valley, of which our northern extension is a part, was formed.

In the course of weathering, the clay originally deposited admixed with calcium carbonate was set free, forming a deep brown soil termed by specialists the Hagerstown loam. To this soil the clay has contributed abundant potassium; and organisms living in the sea concentrated phosphorus, which became disseminated through the limestone and has accumulated in the soil. Any soil acids which tend to form on weathering are soon neutralized by the excess calcium carbonate, so nitrogen-fixing micro-organisms flourish and add this third major nutrient.

Mention may be made of one minor feature with geological if not horticultural interest. Along with the calcium and magnesium there was deposited a certain amount of iron, which on weathering tends to collect in pockets and caverns, in the form of limonite or "bog-iron ore." During the 19th century such material was mined and used as a source of iron at several places in the Whitemarsh valley. On the limestone plateau toward the north border of the Arboretum tract there is a pit representing one of these former mines. All workable ore was long ago removed, however, and the digging is now largely filled with debris and overgrown with shrubs and trees.

Superimposed on these several rock formations lies alluvium deposited by the Wissahickon Creek during overflows which recur year after year. Its water is well charged with both mud and nutrients eroded from headwater fields, and the soil is correspondingly the richest on the Arboretum tract. The fact that it is subject to periodic inundation, however, makes it unsuitable for extensive ornamental plantings.

Ecological Considerations

By adjusting local conditions, horticulturists can grow practically every desired plant at almost any spot on the earth's surface. The more the natural environment has to be changed, however, the greater the expense and the less the permanence of the plantings. Manifestly a minimum of expense and a maximum of permanence will result from collaborating with Nature, and locating plantings in situations which the species will choose when engaged in its "struggle for existence."

The Morris Arboretum is fortunate in having within its boundaries extensive areas of both acid and of neutral (or at any rate circumneutral) soil, occupying the outcrops of quartzite and limestone respectively. Observations in places which have been but little disturbed by man, both on our grounds and in the general neighborhood, indicate that native species have indeed shown preferences for one or the other type of soil.

In primeval times the acid soil of the hills was occupied by forest in which representatives of the red-oak subgenus were dominant, with an understory including dogwood, azalea, and blueberry. On the steep slope toward the Creek this was replaced by (and today exhibits) a grouping of hemlock, chestnut-oak, and sweet birch. By way of contrast, the neutral soil of the limestone plateau supported a forest in which elms, walnuts, hickories, and members of the white-oak group were prominent. On the alluvial terrace grew a still different assemblage, — river-birch, tulip-tree, sycamore, and box-elder, with spice-bush as understory.

Now that these soil contrasts are recognized, future plantings at the Arboretum can be guided thereby. Of course, when an individual tree or lesser plant is first set out, the nutrients in its "ball-of-earth" and those made available by the disturbance of the soil involved in digging the hole

* Photograph by Dr. Ernst J. Schreiner.

to receive it, may lead to its growing well at the start, no matter into what habitat it is placed. When these nutrients are exhausted, however, it can be expected to grow to normal maturity only if located where the conditions are suitable to its needs.

This matter will soon have to receive attention, for example, in the development of the Michaux Quercetum now being undertaken. Of ten common species of oaks of the middle Atlantic States, acid soils are selected by *Q. coccinea, phellos, prinus, rubra,* and *velutina;* neutral soils by *Q. alba, bicolor, imbricaria, macrocarpa,* and *Muehlenbergii.* These and others for which data are available can be assigned to permanent locations on the respective kinds of soils. For species received without information as to their preferences, it will be desirable to make small plantings in both soil areas, and judge by the way in which the trees respond whether their requirements have been met.

CEDRELA SINENSIS

HUI-LIN LI

Although *Cedrela sinensis* was introduced into the United States in 1862, it has not been widely planted. A highly commendable tree in many respects, it is eminently worthy of more extensive cultivation. As an ornamental subject, it is stately and well shaped, with large pinnately compound leaves producing a distinctly tropical effect in the landscape. It is fast growing and free of insect pests. As a shade tree, it has already proved its merit in some of the streets in Philadelphia. Since the wood is of excellent quality, especially suitable for furniture making, it is also of great value as a timber tree.

Cedrela sinensis is a deciduous tree about 60 feet tall, with shredded bark, a usually straight trunk, and a well shaped rounded and dense habit. It has long pinnately compound leaves with 10-22 leaflets. The leaves vary greatly in size and in the number of leaflets. The margins of the leaflets vary from entire to remotely serrulate. The flowers are small, whitish, and more or less fragrant, produced in large drooping panicles. The fruits are small oval-shaped capsules splitting open when mature and freeing the many winged seeds.

Cedrela thrives best in rich loamy lime soils, but grows also in other diverse soil conditions. It can be propagated by seeds and also sprouts readily from the trunk and roots.

The genus *Cedrela,* which belongs to the Meliaceae or Mahogany Family, contains some 20 species occurring in the tropical regions of America and the Old World. *Cedrela sinensis* is a native of China and one of the only two species of the genus that grow in temperate regions. In China it is of very wide distribution and is also commonly planted. It is a variable species with several recognized varieties. In cultivation it is hardy in Europe and in North America as far north as Massachusetts. The other temperate species of the genus, *Cedrela Rehderiana,* is of local occurrence in southwestern China and has not been introduced into cultivation (4).

Most authors follow C. deCandolle (1, 2) in including the Asiatic species in the genus *Cedrela* instead of placing them in a separate genus *Toona* as done by Harms (3) and a few others. The species of the Old and the New World are so close to each other that generic segregation is scarcely warranted. There is also no striking difference in anatomical characters and the woods have the same general texture and appearance and the same characteristic odor.

The wood of all species of Cedrela is fine-grained, and many of the tropical species yield excellent timber well known for its high quality. Mahogany of tropical America is normally the wood of *Swietenia,* also a member of the Meliaceae, but sometimes wood of other genera of this family is also used. The fragrant wood of *Cedrela odorata* of the West Indies is extensively employed in the making of cigar boxes. It is said that the aroma of the wood improves the flavor of the tobacco. *Cedrela sinensis* has a wood of similar fine quality. It is finely grained, yellow-brown in color and beautifully banded with red. The fresh bark and wood

Fig. 22. *Cedrela sinensis,* Andorra Nursery.

Fig. 23. *Cedrela sinensis,* Andorra Nursery.

have a distinct odor not dissimilar to that of *Cedrela odorata* but to some the smell is somewhat onion-like. In China, the wood is used for high grade furniture, ship building and interior finish, and is known to foreign residents there as "Chinese Mahogany." As the only tree of temperate regions yielding wood of such fine quality, its possibilities as a timber tree in many countries deserve careful exploitation by the forester.

In China, the young shoots of this tree are gathered in early spring and cooked or pickled as a highly esteemed vegetable. The tender leaves are sometimes reddish and slightly fragrant. The trees are often planted around the house for this use and they are often kept low for easy picking of the young shoots.

Around Philadelphia, Cedrela proves to be well adapted and there are many fine trees, planted apparently toward the end of the last century. On the grounds of the Morris Arboretum, a large tree which was cut down in 1936 had 38 annual growth rings, indicating that it was planted around 1898. Since then a grove of stately trees has sprouted from the trunk and the spreading roots of the old tree.

About a mile from the Arboretum, on the grounds of the Andorra Nursery, there is a fine grove of large trees which are apparently 50-60 years of age. They appear to be sprouts from an earlier tree, long since disappeared. The trees are about 60 feet tall. (Fig. 22).* The trunks of these trees are mostly very straight and do not branch until they are about 20 feet from the ground. The larger ones measure 7½ feet in circumference. (Fig. 23).

An avenue lined with fine specimens of Cedrela lies in the Mt. Airy section of the city of Philadelphia along Vernon Road. These and others around that region were originally planted on the grounds of the former Meehan Nursery some sixty years ago, and most probably the old tree of the Morris Arboretum and the trees of the Andorra Nursery all came from the same source. These trees are not as tall as those Andorra trees since they are subject to frequent trimming. The largest specimen has a trunk measuring 7½ feet in girth. Despite the adverse condition of the substratum and the more smoky and sooty air of the city, the trees are mostly of healthy appearance. (Fig. 24.) That they are well adapted for street planting thus seems to be amply proven. The large feathery compound leaves have a tropical effect that proves to be a pleasant variation from the much planted plane tree of the surrounding streets.

That such a valuable tree as Cedrela has received relatively little attention in the past is probably partly due to its close similarity in general appearance to the ubiquitous Ailanthus. The latter is the commonest spontaneous tree in many urban environments in both Europe and North America, sometimes the only tree which flourishes under such conditions. It crops up everywhere, and when cut down, sprouts rapidly, forming a dense, screen-like growth. It becomes in many places a very un-

Fig. 24. *Cedrela sinensis,* Vernon Road, Mt. Airy, Philadelphia.

* Photographs by Dr. J. W. Wright.

desirable weed. Cedrela, because of its similar appearance, is often confused with Ailanthus by the casual observer and thus left unnoticed.

Actually Cedrela has all the desirable but none of the undesirable qualities of Ailanthus plus additional meritorious features of its own. Both trees are hardy, vigorous growers, nearly free from pests. Both sprout readily from the trunk or roots, but Cedrela does not spread like a weed. Ailanthus, which is dioecious or polygamous, has male flowers that produce a disagreeable odor and the pollen is said to be irritating to the respiratory tracts of some people. The flowers of Cedrela, which are perfect, are slightly fragrant. The foliage of Ailanthus also exhales a disagreeable odor when bruised. The wood of Ailanthus is of poor quality, being light and brittle and easily broken, while that of Cedrela is of very fine quality. Branches of Ailanthus often split in wind and storm, but the branches of Cedrela are sturdy and strong and do not break easily. Although the two trees are of similar general appearance, Cedrela is of more regular and dense growth and hence more ornamental. It is also a more long-lived tree.

The two trees can be distinguished easily by their foliage. The leaflets of Ailanthus are readily identified by the 2-4 coarse teeth near the base, each bearing a large gland beneath. The leaflets of Cedrela, which are remotely and slightly serrulate or almost entire, do not bear such glandular teeth. (Fig. 25.) When in fruit, Ailanthus is readily distinguished by the winged samara, while the fruits of Cedrela are woody capsules.

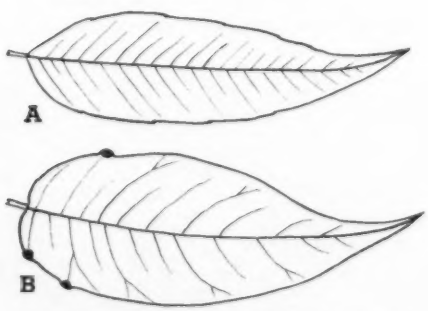

Fig. 25. Leaflets of: A. *Cedrela sinensis;* B. *Ailanthus altissima.*

The common Ailanthus is *Ailanthus altissima,* sometimes known as *A. glandulosa.* It is also a native of China and a common and widely distributed tree there. It is commonly though erroneously called the Tree of Heaven. This name was originally intended for a tropical Malayan species of the same genus, *A. moluccana,* because of its exceedingly tall habit.

Ailanthus, though undesirable in many respects, has large pinnately compound foliage which is useful in creating tropical effects. The tree, fully developed within a few years, usually has a shapely rounded form. It is easily propagated by seeds or root cuttings. These characters, together with its ability to withstand very unfavorable conditions where other trees cannot be used, show that this tree is not entirely valueless.

The two trees, Cedrela and Ailanthus, not only resemble each other in foliage and general appearance, but they are also botanically related. Although Cedrela belongs to the Meliaceae and Ailanthus to the Simarubaceae, these two families are phylogenetically very close to each other. The resemblance of the two genera in question is so close that once the botanist Carrière was misled in describing *Cedrela sinensis* as a species of Ailanthus.

Both Cedrela and Ailanthus have long been cultivated in their native country, China, where in some parts of the country Ailanthus is used for raising wild silkworms. The Chinese have long recognized their close relationships. The classical name of Cedrela is *Chuen* or "Springtree." It is commonly called *Hsiang chuen* or "Fragrant Spring-tree." Ailanthus is colloquially called *Chu chuen* or "Stinking Spring-tree." The classical name of Ailanthus is *Shu* or "Cloud-tree." Because of the poor quality of the wood, *Shu* becomes a metaphor for a "useless person." On the other hand, because of its long and durable life, *Chuen* or Cedrela is used as a literary figure of speech for "father," most respected and venerable in the Chinese way of life.

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A Progress Report on the Michaux Quercetum

HUI-LIN LI

In a previous article in this Bulletin (Vol. 5: 54-57, 1954), Drs. J. R. Schramm and E. J. Schreiner outlined the aims, general plan and procedure of the Michaux Quercetum, a joint project of the Morris Arboretum of the University of Pennsylvania and the Northeastern Forest Experiment Station of the Forest Service, U. S. Department of Agriculture, financed in part by the Michaux Fund of the American Philosophical Society.

Active work of the project began in the spring of 1953. As reported by Drs. Schramm and Schreiner, by the end of the first season (1953), 29 botanists and personnel of the U. S. Forest Service had sent in a total of 150 separate acorn collections representing 37 species and 23 states. Continued collecting in 1954-55 has brought in to date 240 additional seed collections, amounting to 40 species and 9 varieties from America and four foreign species. The number of states represented now amounts to 33 in the United States plus Quebec, Canada. The number of individual botanists collaborating now totals 45 in addition to 41 persons belonging to 14 different Forest Service stations.

The list of species of oaks now represented covers practically all the common ones of this country, with a fair representation of each from different locations within its geographical range. A number of these species needs further collecting in order to have a wider geographical representation. The assistance of collaborators is also solicited for locating and collecting the as yet unrepresented species of rarer occurrences. A list of the species and varieties of North America, together with their geographical collections now represented in the Michaux Quercetum, is appended herewith.

Efforts were made during the last year to extend the area of collecting to Europe and Asia. Contacts were made with botanists and foresters in many different countries in Europe by Dr. Schramm. So far the response has been very favorable and we expect to receive in the next two years collections from these various foreign sources and also from Asia.

Up to the present, about 26,000 seeds have been planted. Since the average germination of all lots for the past two years came to about 60% (aside from 1,400 seeds planted this year), about 14,500 seedlings germinated. Aside from seedlings taken for herbarium specimens, and those which winter-killed or perished because of transplanting from the seed bed to the nursery, there are about 11,000 young trees and seedlings on hand.

The seedlings are left in the seed bed until the second spring to test for hardiness. The first year seedlings (1953) are now all transferred to the specially prepared nursery. (Fig. 26.) The second year seedlings (1954) are still in the seed bed but will be transplanted to the nursery in the spring of 1956. Altogether 5 rodent-proof seed beds, each measuring 100 feet long and 4 feet wide, were specially constructed for this purpose. The nursery space now taken up by these oak seedlings amounts to 34,000 square feet.

Observations made in 1954 and 1955 show that germination takes place from late April to early June. By the first week of June, about 90% of the seedlings are up. In general the earliest to come up are mostly the West Coast species and also the following: *Q. alba, Q. borealis, Q. coccinea, Q. macrocarpa, Q. prinus, Q. Shumardii,* and *Q. velutina.* The earliest of the eastern oaks are *Q. borealis* and *Q. prinus.*

Among the late germinating species are *Q. bicolor, Q. chrysolepis, Q. cinerea, Q. Chapmanii, Q. ellipsoidalis, Q. falcata, Q. ilicifolia, Q. imbricaria, Q. laurifolia, Q. lyrata, Q. marilandica, Q. myrtifolia, Q. Nuttallii, Q. nigra, Q. palustris, Q. prinoides, Q. phellos, Q. stellata* and *Q. virginiana.* The evergreen species are especially tardy. In the last two years some of the above mentioned species like *Q. Chapmanii, Q. laurifolia, Q. myrtifolia* and *Q. virginiana* did not start to germinate until the end of May or early June, with the result that

Fig. 26. Nursery of the Michaux Quercetum.

many of the seedlings were burned off at the ground level by the hot sun.

A preliminary analysis of the measurements on rate of growth taken during the growing seasons show that there are significant differences due to geographical origin of the parent trees of the same species. There is also evidence in some cases that there is a possible correlation between the growth rate of the seedlings and the latitudinal site of the parent tree. This may be due to an inherited photoperiodic effect or racial vigor.

The seedlings of 1953, now outplanted in the nursery, are recorded for their mortality and die-back. The mortality is largely due to winter-killing, although the effect of transplanting should also be counted. However, this effect seems to be negligible. The mortality rate of nearly all species collected from the eastern and northern states is, as might be expected, very low, ranging from 0 to about 10%, averaging about 5%. Death due to transplanting or drought, etc. therefore cannot exceed this figure. However, species from outlying areas present a very different picture. The species from the West Coast are listed in the following table:

State	Species	Mortality
California	*Q. agrifolia*	94%
	Q. chrysolepis	88%
	Q. Douglasii	44%
	Q. dumosa	47%
	Q. d., var. *bullata*	90%
	Q. Garryana	36%
	Q. Kelloggii	30%
	Q. lobata	37%
	Q. myrtifolia	72%
	Q. Wislizenii	60%
Oregon	*Q. Kelloggii*	18%
Washington	*Q. Garryana*	20%

Nearly all the survivals of these species suffered from considerable winter die-back. It is to be expected that the mortality rate will be further increased after the second winter. On the other hand, among the plants from the northeastern states, not only is the mortality rate either very low or non-existent, but practically no winter die-back is observed.

From the above table, it is interesting to note that the two species from California that have the lowest mortality rate, *Q. Kelloggii* and *Q. Garryana*, are species of wider ranges that extend also to the northern states, and these same species from Washington or Oregon show a considerably lower mortality rate than those from California.

More or less similar results are noted from other areas such as Texas, Florida, etc. These preliminary comments will be verified and extended by further observation on additional collections covering wider ranges from the second year's crop.

A list of native species and varieties represented in the Michaux Quercetum, 1955:

1. *Q. agrifolia* Neé Calif.
2. *Q. alba* L. Quebec, N. H., Mass., N. Y., Pa., N. J., Md., Va., N. C., Mich., Wisc., Ill., Tenn., Ark., Tex.
3. *Q. bicolor* Willd. Mich., Ill.
4. *Q. borealis* Michx. f. (*Q. rubra* auct. non L.) N. H., Mass., N. Y., Pa., N. J., N. C., W. Va., Tenn., Mich., Ill.

4a. *Q. borealis*, var. *maxima* (Marsh.) Ashe Quebec, N. H., Ill., Kan.

5. *Q. Chapmanii* Sarg. Fla.
6. *Q. chrysolepis* Liebm. Ore., Calif.

6a. *Q. chrysolepis*, var. *vaccinifolia* (Kell.) Engelm. Calif.

6b. *Q. chrysolepis*, var. *Palmeri* (Engelm.) Sarg. Calif.

6c. *Q. chrysolepis*, var. *nana* (Jepson) Jepson Calif.

7. *Q. coccinea* Muench. Va., Tenn., N. C., Ala., Ill.
8. *Q. Douglasii* Hook. & Arn. Calif.
9. *Q. dumosa* Nutt. Calif.

9a. *Q. dumosa*, var. *turbinella* (Greene) Jepson Calif., Ariz.

9b. *Q. dumosa*, var. *bullata* Engelm. (*Q. durata* Jepson) Calif.

10. *Q. ellipsoidalis* Hill Minn.
11. *Q. falcata* Michx. N. J., Md., Va., Ala., Ill., Ark.
12. *Q. Gambellii* Nutt. Colo., Utah, Ariz.
13. *Q. Garryana* Dougl. ex Hook. Wash., Ore., Calif.
14. *Q. grisea* Lieb. Ariz.
15. *Q. ilicifolia* Wang. Conn., Pa., N. J., W. Va., Va.
16. *Q. imbricaria* Michx. Ohio, Ind., Ill.
17. *Q. incana* Batr. (*Q. cinerea* Michx.) Tex.
18. *Q. Kelloggii* Newb. Ore., Calif.
19. *Q. laevis* Walt. Fla.
20. *Q. laurifolia* Michx. (*Q. obtusa* (Willd.) Ashe) S. C., Fla., Ark.
21. *Q. lobata* Neé Calif.
22. *Q. lyrata* Walt. Miss., Ark., Tex.
23. *Q. macrocarpa* Michx. Minn., S. D., Kan.

24. *Q. marilandica* Muench. N. J., Ill., Kan., Ark., Tex.
25. *Q. Michauxii* Nutt. (*Q. prinus* auct. non L.) S. C.
26. *Q. Muhlenbergii* Engelm. Va., Kan.
27. *Q. myrtifolia* Willd. Fla.
28. *Q. nigra* L., Md., Va., Miss., Ark.
29. *Q. Nuttallii* Palmer. Miss.
30. *Q. palustris* Muench. Pa., Ohio, Ill.
31. *Q. phellos* L. N. J., Md., Va., S. C., Miss., Ark.
32. *Q. prinoides* Willd. Kan.
33. *Q. prinus* L. Mass., Conn., Pa., N. J., Md., Va., Ohio
34. *Q. pumila* Walt. Fla.
35. *Q. Sadleriana* R. Br. Calif.
36. *Q. Shumardii* Buckl. Ill., Tenn., Miss., Fla.

36a. *Q. Shumardii,* var. *Schneckii* (Britt.) Sarg. Tenn.

37. *Q. stellata* Wang. Conn., Md., Ill., Tenn., Mo., Ark.

37a. *Q. stellata,* var. *Margaretta* (Ashe) Sarg. Fla.

38. *Q. velutina* Lam. Mass., Conn., Va., N. C., Tenn., Ala., Mo., Mich., Minn., Ill., Ark.
39. *Q. virginiana* Mill. Va., S. C., Fla.
40. *Q. Wislizenii* A. DC. Calif.

40a. *Q. Wislizenii,* var. *frutescens* Engelm. Calif.

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GIFT TO THE LIBRARY

It is a pleasure to acknowledge here the handsome gift of Mr. Albert F. Meehan who has recently donated to the Library of the Arboretum bound sets of Gardner's Monthly, Vol. I, 1859, to Vol. XXIX, 1887, and Meehan's Monthly, Vol. I-IV (1891-1894, VI-VII (1896-97) and XI (1901).

Gardener's Monthly, "Devoted to Horticulture, Arboriculture, Botany and Rural Affairs," was edited by Mr. Meehan's grandfather, Thomas Meehan, well-known horticulturist and botanist and founder of the Germantown Nurseries, later known as Meehan's Nurseries. As one of the foremost horticultural publications of its day, Gardener's Monthly numbered among its contributors the leading horticulturists in America. It therefore constitutes today a valuable historical record of horticultural ideas and practices during the second half of the last century.

Publication of Gardener's Monthly ceased with the death of its publishers, but in 1891 Thomas Meehan began publishing Meehan's Monthly, which he designated as "A Magazine of Horticulture, Botany and Kindred Subjects." Publication was continued after his death in 1901 by one of his sons, S. Mendelson Meehan.

These two publications, replete with valuable horticultural information, are important additions to our list of periodicals and will be greatly appreciated and much used by those who consult our Library. We are indeed indebted to Mr. Meehan for his kindness.

A future number of this Bulletin will contain an article on the Library of the Morris Arboretum.

J. L. B.

DR. WHERRY'S BOOK ON PHLOX

Under the official publication date of November 18, 1955, there appeared Volume III of the Morris Arboretum Monographs: *The Genus Phlox,* by Dr. Edgar T. Wherry, Professor of Botany, Emeritus, of the University of Pennsylvania and for many years a member of the Scientific Staff of the Morris Arboretum.[1]

For more than a quarter of a century Dr. Wherry has been an acknowledged authority on this essentially American genus of plants, and the present long-awaited volume, which embodies his careful observations in the field and in the herbarium, will be enthusiastically received by botanists and flower-lovers throughout this country and abroad.

The genus *Phlox,* as here treated, includes 67 species, 84 subspecies and a number of minor variants. The work is copiously illustrated with the author's excellent photographs and a series of line-drawings and range-maps prepared by Dr. Hui-Lin Li, a member of the Staff of the Morris Arboretum.

In addition to the purely descriptive material, the author has provided a full set of keys to the sections, subsections, species and subspecies. The geographic origin and evolutionary relationships within the genus are discussed and suggestions concerning desirable horticultural forms are offered.

The volume is priced at $4.00 per copy, but is available to Associates of the Morris Arboretum at the special rate of $3.00.

J. M. F., Jr.

[1]The other volumes in this series of Monographs published by the Associates of the Morris Arboretum are:
The Beginnings of Plant Hybridization by Conway Zirkle, 1935.
Conservation of Renewable Natural Resources —University of Pennsylvania Bicentennial Symposium, 1941.

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